

Amendments to the Drawings:

The attached replacement drawing sheets make changes to Figs. 25 and 26 and replace the original sheets with Figs. 25 and 26.

Attachment: Replacement Sheets

REMARKS

Claims 1-6, 13, 14 and 42-45 are pending in the application. By this Amendment, the drawings, title, Abstract, specification and claims 1-6, 13 and 14 are amended, and claims 42-45 are added. Support for added claims 42-45 can be found, for example, in the original claims and on pages 20 and 23 of the specification. No new matter is added. Claims 7-12 and 15-41 are canceled without prejudice to, or disclaimer of, the subject matter recited in those claims. Reconsideration of the application in view of the above amendments and the following remarks is respectfully requested.

Applicants appreciate the courtesies shown to Applicants' representatives by Examiner Robertson in the December 20, 2010 telephone interview. Applicants' separate record of the substance of the interview is incorporated into the following remarks.

The Office Action objects to Figs. 1-3, 25 and 26 of the drawings. As discussed during the interview, Figs. 1-3 are not prior art. For example, as described in the Brief Description of Drawings section, Figs. 1-3 illustrate an example of semiconductor manufacturing equipment for carrying out the present invention. Further, Figs. 1-3 illustrate an optical sensor 9 which is not necessarily commonly used in prior art manufacturing equipment. Thus, as discussed during the interview, Figs. 1-3 are not amended because they do not illustrate only that which is old.

With respect to Figs. 25 and 26, the drawings are amended to include a legend "Prior Art" as suggested in the Office Action.

Accordingly withdrawal of the objection to the drawings is respectfully requested.

The Office Action objects to the Abstract of the Disclosure for its length. By this Amendment, the Abstract is amended so as not to exceed 150 words. Accordingly, withdrawal of the objection to the Abstract is respectfully requested.

The Office Action objects to the title of the invention. By this Amendment, the title is amended as suggested in the Office Action. Accordingly, withdrawal of the objection to the title is respectfully requested.

The Office Action objects to the specification. By this Amendment, the specification is amended for clarity, to remove specific claim numbers, and to provide appropriate section headings. Accordingly, withdrawal of the objection to the specification is respectfully requested.

The Office Action objects to claims 4 and 10 for informalities. The objection to canceled claim 10 is moot. By this Amendment, claim 4 is amended to obviate the objection. Accordingly, withdrawal of the objection to claim 4 is respectfully requested.

The Office Action rejects claims 7-12, 15-17, 21, 25 and 27-41 under 35 U.S.C. §112, second paragraph. By this Amendment, claims 7-12, 15-17, 21, 25 and 27-41 are canceled. As discussed during the interview, claims 42-45 are added, and recite similar subject matter as previously recited in the now canceled claims. Additionally, claims 42-45 recite a computer, as discussed during the interview, and suggested in the Office Action. Accordingly, withdrawal of the rejection is respectfully requested.

The Office Action rejects claims 13-19, 21-23, 25-28, 30-32, 34, 35, 37, 40 and 41 under 35 U.S.C. §102(e) over U.S. Patent No. 6,198,976 to Sundar et al. (Sundar). The Office Action rejects claims 20, 24, 29 and 33 under 35 U.S.C. §103(a) over Sundar. The rejection of canceled claims 15-35, 37, 40 and 41 is moot. The rejection of claims 13 and 14 is respectfully traversed.

Sundar fails to disclose at least a method for automatically positioning a disc-like object including a step of selecting a common perpendicular bisector among three perpendicular bisectors with respect to the intersections of the three pairs, as recited in independent claim 13, and illustrated, for example, in Fig. 12 of the present application.

Sundar defines an imaginary circle based on collected data points, compares the calculated center and radius of the imaginary circle with the center and radius calculated from the actual measured data points, and disregards any results exceeding an allowed tolerance to determine a best fit circle (see col. 10, lines 10-58). Sundar discloses that a center can be calculated based on an intersection between perpendicular bisectors 236 and 238 of chords 232 and 234 between data points on the circle (see col. 10, lines 43-58 and Fig. 7). However, this intersection of perpendicular bisectors cannot reasonably be considered to correspond to the claimed common perpendicular bisector recited in independent claim 13.

For example, as illustrated in Fig. 12 of the present application, a common perpendicular bisector 42 is formed from the perpendicular bisectors of the chords formed between the pairs of points corresponding to detection routes 44 and 45 (see, for example, page 14). The perpendicular bisector 48 is not common (overlapping) with the other perpendicular bisectors because of the presence of the notched portion 51. Because the perpendicular bisectors of the chords between the pairs of points corresponding to the detection routes 44 and 45 form a common (overlapping) perpendicular bisector, this common perpendicular bisector is used in determining a center and radius.

As illustrated at least in Fig. 7 of Sundar, Sundar fails to disclose the claimed common perpendicular bisector. Accordingly, independent claim 13 is patentable over Sundar. Claim 14 depends from claim 13 and is, therefore, also patentable over Sundar at least for the dependence, as well as for the additional features that claim 14 recites. Accordingly, withdrawal of the rejections is respectfully requested.

The Office Action rejects claims 1-12, 36, 38 and 39 under 35 U.S.C. §103(a) over Sundar, in view of U.S. Patent No. 5,917,601 to Shimazaki et al. (Shimazaki). The rejection of canceled claims 7-12, 36, 38 and 39 is moot. The rejection of claims 1-6 is respectfully traversed.

Sundar and Shimazaki would not have rendered obvious a method for automatically teaching a reference position including a step of determining a center position of a disc-like object including a step of relatively moving a detection means against the disc-like object and making one locus of the detection means cross against a circumference of the disc-like object, and a step of calculating the center position using a specific point on a perpendicular bisector of a section of a line combining the two intersections, the two intersections and the radius of the disc-like object, as recited in independent claim 1, and similarly recited in independent claims 3 and 4.

As discussed above, Sundar defines an imaginary circle based on data points on the circle, compares the center and the radius of the imaginary circle with the center and the radius calculated from actual measured data points, and disregards any results exceeding an allowable tolerance to determine a best fit circle. Shimazaki discloses using an optical sensor having linearly arranged light-receiving elements to detect concave portions and convex portions on a wafer. The method of Shimazaki accurately detects edge positions of the wafer as digital data, in contrast to the claim features which calculate a center of a circle from a plurality of points on the circumference.

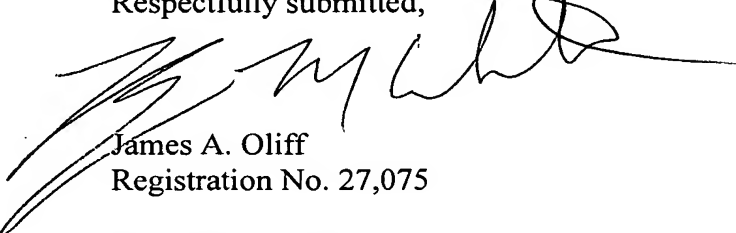
Further, Shimazaki discloses that the detecting unit is arranged at a predetermined position, and measures the wafer while the wafer stands still (see col. 3, lines 4-6). That is, the detecting unit of Shimazaki does not move relative to the wafer.

Thus, the combination of Sundar and Shimazaki would not have rendered obvious each of the features recited in independent claims 1, 3 and 4, and the independent claims are patentable over the combination of applied references. Claims 2, 5 and 6 depend from independent claims 1 and 3, and are, therefore, also patentable over the applied references at least for the dependence, as well as for the additional features these claims recite.

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-6, 13, 14 and 42-45 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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Attachments:

Amended Abstract
Replacement Sheets for Figs. 25 and 26

Date: December 28, 2010

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